

## Claims

- [c1] An apparatus for producing nonsymmetrical three dimensional food products comprising:  
an iris diaphragm for shaping and portioning food product fed therethrough;  
a food pump for feeding food product to the iris diaphragm;  
a gearbox having a plurality of gears connected to the iris diaphragm for opening and closing said diaphragm to the feed of food product;  
a motor connected to the gearbox to drive the gears in the gearbox;  
a vector drive controlling the motor; and,  
an encoder providing signals to the vector drive directing the operation of the motor to shape the food product exiting from the iris diaphragm.
- [c2] An apparatus for producing nonsymmetrical three dimensional food products in accordance with Claim 1 further including:  
a plurality of iris diaphragms coupled to the gearbox to function simultaneously shaping and portioning food product.
- [c3] An apparatus for producing nonsymmetrical three dimensional food products in accordance with Claim 1 wherein:  
the motor comprises an induction motor, which may be controlled to start, stop, speed up, slow down and reverse during a single pumping operation to provide a predetermined shape from the iris diaphragm.
- [c4] An apparatus for producing nonsymmetrical three dimensional food products in accordance with Claim 1 wherein:  
the iris diaphragm comprises a plurality of moveable blades arranged in a shutter like configuration to provide an opening for food product, a blade drive ring connected to the blades to open and close the blades about said opening in a predetermined sequence related to the product being formed, a drive lever having one end connected to the drive ring and the other end connected to the gear box; and,  
a flip cutter mounted adjacent the iris opening to flip off the shaped food product at the end of a portion.
- [c5] An apparatus for producing nonsymmetrical three dimensional food products

comprising:

an iris diaphragm for shaping and portioning food product fed therethrough;  
a food pump for feeding food product to the iris diaphragm;  
a gearbox having a plurality of gears connected to the iris diaphragm for opening and closing said diaphragm to the feed of food product;  
a motor connected to the gearbox to drive the gears in the gearbox;  
a servo device controlling the motor; and,  
an encoder providing signals to the servo drive directing the operation of the motor to shape the food product exiting from the iris diaphragm.

- [c6] An apparatus for producing nonsymmetrical three dimensional food products in accordance with Claim 5 wherein:  
the motor comprises a synchronous motor.
- [c7] The method of producing nonsymmetrical three dimensional food products comprising:  
providing a diaphragm to open and close in a predetermined manner to provide a shaped food product;  
pumping a food product through the diaphragm when open; and,  
actuating the diaphragm and controlling the movement of the diaphragm to open and close on the flow of food product to shape said product.
- [c8] The method of producing nonsymmetrical three dimensional food products in accordance with Claim 7 further providing:  
encoder instructions to control the diaphragm movement to produce a predetermined nonsymmetrical three-dimensional food product.
- [c9] The method of producing nonsymmetrical three dimensional food products in accordance with Claim 8 wherein:  
a plurality of diaphragms is provided, each actuated and controlled to simultaneously open and close on the flow of food product to shape said product.
- [c10] The method of producing nonsymmetrical three dimensional food products in accordance with Claim 8 further comprising the steps of:

providing a motor to actuate the diaphragm; and,  
using flux control to maintain predetermined motor positioning.

- [c11] The method of producing nonsymmetrical three dimensional food products in accordance with Claim 8 including:  
using voltage control to maintain motor positioning of the diaphragm movement to produce a predetermined nonsymmetrical three dimensional food product.
- [c12] An apparatus for producing nonsymmetrical three dimensional food products in accordance with Claims 1 and 5 where:  
the food products comprise products such as chicken drummies, fish and torpedoes.